The Desert Tortoise and Upper Respiratory Tract Disease

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BACKGROUND -- UPPER RESPIRATORY TRACT DISEASE IN CAPTIVE TORTOISES

A disease characterized by a mild to severe nasal discharge has been seen for many years in captive tortoises in Europe, England, and the United States. Although a complete list of the number of species of tortoises known to develop this disease is unavailable, it would be fair to say that until proven otherwise, all species of tortoises should be considered susceptible. In England, this disease is commonly seen in Greek (*Testudo graeca*) and Hermann's (*T. hermanni*) tortoises.[1] The disease has also been seen in free-ranging gopher tortoises (*Gopherus polyphemus*) in Florida (Jacobson, pers. comm.). At the Veterinary Medical Teaching Hospital, University of Florida, species of tortoises presented with nasal discharge include Greek tortoises, leopard tortoises *Geochelone pardalis*), radiated tortoises (*Geochelone radiata*), Indian star tortoises (*Geochelone elegans*) and gopher tortoises (*Gopherus polyphemus*). The disease has also been commonly seen in captive desert tortoises (*Gopherus [=Xerobates] agassizii*).[2]

Until 1990-1991, attempts at demonstrating or incriminating a casual agent were unsuccessful. Because of negative findings and the failure to incriminate a specific bacteria, a virus was considered as a possible cause.[3] In studies conducted on captive desert tortoises, a bacterial organism, *Pasteurella testudinis*, was isolated and incriminated as a possible cause.[4] However, *P. testudinis*, has also been isolated from healthy tortoises and the significance of this organism remains unknown.

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[1]Lawrence, K. and J.R. Needham. 1985. Rhinitis in long term Mediterranean tortoises (*Testudo gracea* and *T. hermanni*). Veterinary Record. 117:622-664.

[2]Jackson, O.F., and J.R. Needham. 1983. Rhinitis and virus antibody titers in chelonians. Journal of Small Animal Practice. 24:31-36.

[3]Snipes K.P., E.L. Biberstein, and M.E. Fowler. 1980. A *Pasteurella* sp. associated with respiratory disease in captive desert tortoises. Journal of the American Veterinary Medical Association. 177:804-807.

[4]Snipes, K.P., and E.L. Biberstein. 1982. *Pasteurella testudinis* sp. nov.: a parasite of desert tortoises. International Journal of Systematic Bacteriology. 32:201-210.

THE APPEARANCE OF UPPER RESPIRATORY TRACT DISEASE IN WILD TORTOISE POPULATIONS

In the 1970's desert tortoises with signs of the disease were observed on the Beaver Dam Slope of Utah, a site where many captive tortoises were being released. In 1988, desert tortoises at the Desert Tortoise Natural Area (DTNA), Kern County, California were seen with clinical signs of illness similar to that of captive desert tortoises. Signs included a mucopurulent discharge from the nares, puffy eyelids, eyes recessed into the orbits, and dullness to the skin and scutes. Based upon these clinical signs, Upper Respiratory Disease Syndrome (URDS) was used to characterize this syndrome.

Surveys of the DTNA in 1989 and 1990 revealed that many tortoises were ill with the disease, and shells of many tortoises indicated a major die-off was underway. Research on long-term study plots with marked tortoises showed that more than 70% of adult tortoises died between 1988 and 1992 (Kristin Berry, pers. comm.). Other surveys indicate that wild desert tortoises with URDS are also widespread in the western Mojave Desert of California, around Las Vegas Valley in Nevada, and on the Beaver Dam Slope of Utah and Arizona.

RESEARCH ON THE CAUSES OF UPPER RESPIRATORY TRACT DISEASE

In May 1989, with a contract from the U.S. Bureau of Land Management, we initiated studies on desert tortoises ill with URDS in an attempt to elucidate the responsible pathogens. During the course of these studies, the pathology of the disease was better understood and findings indicated that the upper respiratory tract was the major site of involvement.[5] Based on these findings the disease was determined to be a chronic upper respiratory tract disease and the acronym URTD was used. Today, URTD more appropriately designates this illness and should replace URDS.

Microbiologic investigations with URTD failed to incriminate a virus as a potential causal agent. *Pasteurella testudinis* was isolated from most of the ill tortoises examined and a previously unidentified *Mycoplasma* was also isolated from ill tortoises.[5] Electron microscopic studies confirmed the presence of *Mycoplasma* on the surface membranes of the upper respiratory tract of desert tortoises ill with URTD.

In 1992, research was conducted on transmission of the disease. The findings support the contention that *Mycoplasma* is the most likely cause of URTD. Koch's postulates have

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[5]Jacobson, E.R., J.M. Gaskin, M.B. Brown, R.K. Harris, C.H. Gardiner, J.L. LaPointe, H.P. Adams, and C. Reggiardo. 1991. Chronic upper respiratory tract disease of free-ranging desert tortoises (*Xerobates agassizii*). Journal of Wildlife Diseases 27(2):296-316.

been fulfilled and a causal relationship between *Mycoplasma* and URTD has been established. Still, *Pasteurella* and other bacteria may affect the severity of the disease.

A serologic (blood) test has been developed at the University of Florida to determine exposure status of tortoises to *Mycoplasma*. Preliminary studies are very promising in that this test may ultimately be useful in assessing condition of tortoises.

Predisposing factors such as poor nutrition (resulting from habitat degradation), drought, and release of captive desert tortoises ill with URTD into the wild are also more than likely involved. The whole issue of release of ill pet desert tortoises needs to be publicized, because this practice should not continue. Transmission studies have clearly demonstrated the infectious nature of URTD. Thus, it is safe to assume that captive ill tortoises can transmit this disease to both captive and free-ranging clinically healthy tortoises.

TREATMENT OF UPPER RESPIRATORY TRACT DISEASE

Until recently, no antibiotics or combination of antibiotics have been efficacious for treating tortoises ill with URTD. With evidence that *Mycoplasma* is the etiologic agent of URTD and that *Pasteurella testudinis* and other gram negative bacteria may contribute to the severity of the disease, antibiotic therapy with enrofloxacin (Baytril, Mobay Corp., Shawnee, Kansas) at 5 mg/kg of body weight every other day for 10 treatments, is considered the therapy of choice. Additionally, injectable enrofloxacin should be diluted 1:10 in sterile saline and a small quantity (up to 0.5 cc) should be flushed up both nares of the affected tortoise utilizing a syringe and attached catheter of appropriate diameter. Flushing should be continued daily for 1 month (at least until the rhinitis has abated). Since enrofloxacin is very irritating to the mucous membranes surrounding the eyes, it is important to avoid contact of enrofloxacin with those tissues. It is important to maintain tortoises at an optimum environmental temperature during the course of treatment. While antibiotic therapy may result in clinical improvement and complete regression of clinical signs, this does not mean that this tortoise will be free of disease thereafter. Turtles may remain carriers of *Mycoplasma* for life with recurrence of the disease at some point in time in the future.

Results of clinical trials with these new drugs and drug combinations for treating tortoises ill with URTD are extremely promising for captive tortoises. Unfortunately the situation for ill free-ranging tortoises in not as promising. Since this disease more than likely is multifactorial, schemes for managing URTD in free-ranging populations are going to be difficult to develop and implement. Minimally tortoise hobbyists and veterinarians can make

a major contribution by getting the word out that captive tortoises should not be released to the wild. More than likely this practice has contributed to the spread of URTD in wild populations of desert tortoises.

SUMMARY

The following points should be remembered with regard to the desert tortoise and URTD:

1. URTD is a chronic infectious disease affecting not only the desert tortoise, but other tortoises as well.

2. Scientific evidence supports the belief that *Mycoplasma* is the infectious agent responsible for URTD.

3. Once infected with *Mycoplasma*, a tortoise may remain a carrier for life.

4. URTD is a transmissible disease. Because of this, tortoises showing clinical signs of illness should be isolated from healthy tortoises.

5. Different species of tortoises should not be kept together in captivity since foreign pathogens may be introduced into new hosts.

6. Although antibiotic treatment may result in complete remission of clinical signs, tortoises may still develop the disease at a future date.

7. Ill or formerly ill desert tortoises should never be released to the wild. Releases of captive tortoises may be responsible for disease outbreaks in the Mojave Desert.

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